

## METEOROLOGY AND AERONAUTICS.

The "Air Service Information Circular (Heavier-than-air)" published by the Director of the Air Service at Washington, under date of May 12, 1920, contains an interesting statement of the kind of meteorological information that is required in the location, layout and maintainance of heavier-than-air flying fields. The meteorologist who is not in personal touch with the practical problems confronting the aviator is prone to neglect or to fail to recognize certain climatological or meteorological aspects of the aviator's work.

The circular is evidently intended to be of service to the aviator or engineer confronted with the task of selecting landing fields, or to the army meteorologist whose duty it is to supply the current meteorological data after the field is in operation. The methods employed by the Meteorological Section of the Signal Corps in France are presented, together with some of the charts which were found useful during the war, namely, the light chart, showing daylight, twilight, moonlight, and starlight, and the chart of magnetic declination. At the end is a short bibliography on aerology and meteorology.

As a guide to these men in the service whose work falls along this line, this circular may serve a useful purpose. But to the meteorologist this concise statement from the flyer as to what he wishes to know about meteorology should serve as a timely guide as to the direction along which he should proceed. In France, J. Rouch has prepared a booklet entitled "*Préparation Météorologique des Voyages Aériens*." There is a field for a similar but more comprehensive work in the United States.—C. L. M.

FLYING OVER CLOUDS IN RELATION TO COMMERCIAL AERONAUTICS.<sup>1</sup>

By Prof. B. MELVILLE JONES.

[Abstract and excerpts from a brief of this paper in *Aeronautics*, Mar. 18, 1920, pp. 240-243.]

The problems confronting the aviator on a long distance flight, when there is a heavy cloud layer quite close to the ground, are manifold. The author inclines toward the view that flying above the clouds has many advantages over flying below clouds, and this view was also held to a greater or less degree by those who participated in the discussion. The difficulties of undercloud flying as enumerated by the author are:

"1. Strain to pilot. [Poor visibility, bumpiness, proximity to earth.]

"2. Danger of collision. [A growing problem, accentuated by poor horizontal visibility.]

"3. Discomfort to passengers and pilots. [Flying above clouds exhilarating; below is depressing.]

"4. Loss of power to use favorable winds. [Choice of altitudes limited.]

"5. Annoyance to people on ground. [As routes become definitely established the noise of high-powered engines would be annoying.]

"6. Danger in forced landings." [One may have a better idea of the nature of the land when flying low, but this would be offset by two advantages from flying above clouds, namely, time to remedy slight mechanical troubles in the air without completing the landing, and, if the pilot were familiar with surface wind direction, opportunity to turn aeroplane so as to land against the wind.]

The difficulties of flying above clouds are also enumerated:

"1. Difficulty of actual in-cloud flying. [Loss of sense of balance by pilot is now being overcome by new instruments.]

"2. Danger that the clouds might come to the ground whilst the aeroplane was in or above them.

"3. Difficulty of navigation. [Must be carried out by dead reckoning, astronomical observation, observation of kite balloons or other guide marks, or wireless.]

"4. Difficulty of finding aerodrome at end of flight.

"5. Danger of collision in clouds.

"6. Possibility of having to reach great heights to clear clouds. [Uncomfortable temperatures and physiological effects.]

"7. Danger from storm clouds."

While this paper discussed the entire problem from the standpoint of commercial aeronautics, and the mobilization of resources and organization to assist in commercial aviation, it is important to note that the paper was occasioned purely by meteorological phenomena. Also, of the 13 dangers enumerated under the heads of undercloud and overcloud flying, seven are directly the result of meteorological conditions, while the remaining five are physiological and mechanical. This emphasizes the fact that the aviator is more dependent upon his understanding of meteorological phenomena than upon all other factors combined, if he will fly with the greatest safety and comfort.

The paper was followed by a discussion<sup>2</sup> in which some of the foremost British aviation authorities participated. Among other points brought out by these men there were several regarding the meteorological organization which will permit of greater safety in flying. One of the points of discussion was how to have a continuous record of wind speed above the clouds. Maj. Dobson said that an instrument for use on a kite balloon had been developed which might give some assistance in this direction, and that a modification of it was desirable which would permit of the recording devices registering at the ground continuously. This would do away with the necessity of hauling the balloon down.

Mr. J. R. Pannell brought out an important point concerning the use of altimeters on long flights. While the pilot is in the air, the barometric pressure may change, with the consequence that his altimeter reading, which was last set before he ascended, might be as much as 300 feet in error. If he is traveling over land whose elevation is variable, his altimeter does not indicate height above the surface, but height above the starting point. To correct this difficulty, changes of surface barometric pressure should be given to the plane by wireless, thus allowing the aviator to make the necessary correction. If there were a means of independently knowing the height, a record of barometric change could be made on the craft. This would be of great advantage to a dirigible on a cruise of several days.

The author summarizes the discussion as follows:

"1. That the power to fly in safety over clouds would be of great value to the commercial value of aviation.

"2. That routine flying over clouds can not be undertaken safely with the facilities at present available to the commercial world.

"3. That probably it could be made safe with a suitable organization of ground stations and meteorology and provided that reliable instruments were more generally available \* \* \*"

<sup>1</sup> Paper read before the Royal Aeronautical Society, March 3, 1920; published in full in *Aeronautical Journal*, May, 1920, pp. 220-249.

<sup>2</sup> Published in *Aero. Journ.*, loc. cit., pp. 238-247.